

Application No.: 10/516,921
Inventor: Dietzen
Docket No.: 53647

REMARKS/ARGUMENTS

Claim Amendments

Claim 1 has been amended to include the limitations of dependent claim 2 and 8.

Claim 2 has been amended to describe a more limited molecular weight range. Support for such amendment can be found at least at page 2, lines 15-18 of the specification.

Claim 6 has been amended to replace the phrase “such as” with “selected from the group consisting of.”

Claim 8 has been amended to describe that the die plate is heated to a temperature in the range of from 20 to 100°C above the temperature of the blowing agent-containing polystyrene melt. Support for the amendment can be found at least at page 4, lines 27-32 of the specification.

Claim 16 has been amended to depend from claim 1.

Claims 18 and 19 have been canceled.

Claims 20 and 21 have been amended to depend from claim 15 and to place them in “product-by-process” format.

No new matter has been entered.

Claim Rejections under 35 USC § 112

Claims 6, 16-18 and 22-24 stand rejected as allegedly indefinite for failing to point out and distinctly claim the subject matter the Applicant regards as the invention.

With regard to claim 6, Applicant has amended such claim to replace the phrase “such as” with “selected from the group consisting of,” thereby obviating the rejection. With regard to claim 16, Applicant has deleted the phrase “if desired,” thereby obviating the rejection. With regard to claim 17, Applicant has amended such claim to properly depend from claim 16. Applicant has canceled claim 18. Claims 22-24 have been amended to properly depend from claim 16.

In view of the above, the rejection should be withdrawn.

Claim Rejections under 35 USC § 103

1. Claims 1-5, 7-9 and 15-24 stand rejected as allegedly obvious in view of Biglione (US 4,606,873) and Zimmerman (US 5,112,875). More specifically, the Office Action assert that, at the time the invention was made, it would have been obvious of one having ordinary skill in the art to use a polystyrene polymer with a molecular weigh of 180,000 to about 300,000 g/mol as taught by Zimmerman in the process of preparing expandable polystyrene polymers as taught by Biglione in order to produce polystyrene granules from expandable polystyrene polymers with a high degree of expandability due to the low level blowing or foaming agents used to make articles like seat cushions. Applicant respectfully traverses the rejection in as much as it may apply to amended claim 1 and those claims depending therefrom.

Applicant has amended claim 1 to further recite that the die plate is heated at least to the temperature of the blowing agent-containing polymer melt. Applicant respectfully submits that such step/feature is not described or suggested by either Biglione or Zimmerman, nor is such feature apparent from that knowledge generally available to the skilled artisan.

Additionally, it should be further appreciated that the claimed invention provides an economical process for producing expandable styrene polymer granules that are small and of uniform size (See page 2, lines 1-6). This is accomplished by extruding a blowing agent-containing styrene polymer melt at a temperature in the range of 140-300° C through a heated die plate having holes with a diameter of at most 1.5mm in order to produce expandable styrene polymers with a molecular weight of from 190,000 to 400,000 g/mol. Accordingly, the molecular weight of the final product, i.e., the expandable styrene polymer, is important, not the molecular weight of the raw styrene polymer feed material. The molecular weight of the expandable styrene polymer corresponds to the molecular weight styrene polymer at the heated die plate, which is not described by Biglione or Zimmerman. In this regard, the molecular weight of the raw styrene polymer is typically higher and the reduction in molecular weight at the heated die plate is attributed to a number of factors, for example, shearing and/or temperature, i.e., the type of mixing device, etc. (See page 2, lines 18-21.). In accordance with claim 1, the blowing agent-containing polymer melt has a temperature in the range of 140 to 300°C at the heated die plate and, at this point, the temperature range corresponds with the

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molecular weight - at lower molecular weights, for example, the melt must be cooled to prevent foaming during the granulation step. (See page 4, lines 21-25).

By contrast, Biglione suggests heating the blowing agent-containing polymer melt to a higher temperature when extrusion holes having a diameter smaller than 1 mm are used. (See Example 1 and Col. 3, lines 36-47). Heating the melt to a higher temperature, however, results in prolonged heating times and further molecular weight reduction. Accordingly, the claimed invention allows a melt to be maintained at a lower temperature during the extrusion process.

With regard to Zimmerman, Applicant respectfully submits that Zimmerman relates to a wholly different process. That is, Zimmerman describes a suspension polymerization process to produce expandable polystyrene, which starts with a suspension of styrene and water, and does not describe or suggest the production of expandable polymers via an extrusion process. In this regard, Zimmerman does not describe or suggest the use of a polymer melt or a heated die plate.

Accordingly, the combination of Biglione and Zimmerman fails to describe or suggest all of the elements of Applicant's claimed process, e.g., the molecular weight of the styrene polymer, the temperature of the polymer melt, the diameter of the die plate holes at the exit and the use of a heated die plate, and there is simply no reasonable rationale or reasoning to suggest that the claimed process would have been obvious to a skilled artisan. Additionally, absent the teachings of the Applicant, the prior art simply fails to provide sufficient teaching, suggestion or motivation to combine the various elements in the prior art in the manner of the Applicant to arrive at the claimed invention.

In view of the above Applicant respectfully submits that the rejection should be withdrawn.

2. Claim 6 stands rejected as allegedly obvious in view of Biglione, Zimmerman and Carmody (US 3,673,126). Applicant traverses the rejection and respectfully submits that Carmody fails to further describe the deficiencies of Biglione and Zimmerman, e.g., a heated die plate. As a result, because claim 6 depends from claim 1 and necessarily includes all of the limitations thereof, the combination of Biglione, Zimmerman and Carmody fails to describe each and every element of the claim 6 to support a rejection under 35 USC § 103.

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The rejection should be withdrawn.

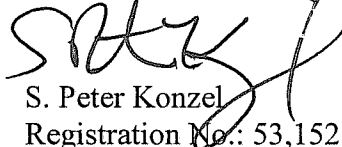
3. Claims 10-14 stand rejected as allegedly obvious in view of Biglione, Zimmerman and Knaus (US 5,605,937). Applicant traverses the rejection and respectfully submits that Knaus fails to further describe the deficiencies of Biglione and Zimmerman, among other things, a heated die plate. As a result, because claims 10-14 depend from claim 1 and necessarily include all of the limitations thereof, the combination of Biglione, Zimemrman and Knaus fails to describe each and every element of the claims to support a rejection under 35 USC § 103.

Conclusion

Applicants respectfully submit that the present application is in condition for allowance, which action is courteously requested. Please charge any shortage in fees due in connection with the filing of this paper, including Extension of Time fees to Deposit Account No. 14-1437. Please credit any excess fees to such deposit account.

Respectfully submitted,

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Attachments
Dated: October 10, 2008